The Journal of Agricultural Science

SENIOR EDITOR
W. J. Whittington

EXECUTIVE EDITOR
N. M. Boston

Journal of Agricultural Science, University of Nottingham, Faculty of Agricultural and Food Sciences, Sutton Bonington Campus, Loughborough, Leicestershire LE12 5RD, UK

EDITORIAL BOARD

E. J. Allen
University of Cambridge, UK

B. W. Bache
University of Cambridge, UK

P. S. Cocks
University of Western Australia, Nedlands, Australia

P. Day
Rutgers University of New Jersey, New Brunswick, USA

W. Day
Silsoe Research Institute, UK

R. N. Edmondson
Horticulture Research International, Wellesbourne, UK

W. v. Engelhardt
Physiologisches Institut der Tierärztliche Hochschule Hannover, Germany

W. Erskine
ICARDA, Aleppo, Syria

M. F. Franklin
Biomathematics & Statistics Scotland, Rowett Research Institute, Aberdeen, UK

M. F. Fuller
Rowett Research Institute, Aberdeen, UK

M. D. Gale
Cambridge Laboratory, JI Centre, Norwich, UK

K. E. Giller
Wye College, University of London, UK

J. C. Gower
Wheathampstead, UK

J. F. D. Greenhalgh
Conwy, UK

A. E. Johnston
IACR-Rothamsted, UK

T. Komiyama
Shirakawa Institute of Animal Genetics, Fukushima, Japan

T. Lewis
IACR-Rothamsted, UK

D. B. Lindsay
Cambridge, UK

J. S. Macfarlane
Centre for Tropical Veterinary Medicine, University of Edinburgh, UK

G. M. O. Maloiy
Institute of Animal Physiology and Biotechnology Research, Nairobi, Kenya

G. F. J. Milford
IACR-Rothamsted, UK

T. R. Morris
University of Reading, UK

J. B. Owen
University College of North Wales, Bangor, UK

C. J. Pollock
Institute of Grassland and Environmental Research, Aberystwyth, UK

T. J. Riggs
Horticulture Research International, Wellesbourne, UK

J. A. Rooke
Scottish Agricultural College, Aberdeen, UK

G. Rothschild
IRRI, Manila, Philippines

P. E. Russell
AgrEvo UK Limited, Chesterford Park, Saffron Walden, UK

R. K. Scott
University of Nottingham, Sutton Bonington, UK

S. K. Sinha
Indian Agricultural Research Institute, New Delhi, India

R. Thompson
IACR-Rothamsted, UK

J. H. Topps
University of Zimbabwe, Harare, Zimbabwe

D. Wilman
University of Wales, Aberystwyth, UK

VOLUME 126

CAMBRIDGE UNIVERSITY PRESS

Cambridge
New York *Port Chester* *Melbourne* *Sydney*
1996

CAMBRIDGE
UNIVERSITY PRESS

PUBLISHED BY
THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE

The Pitt Building, Trumpington Street, Cambridge CB2 1RP,
40 West 20th Street, New York, NY 10011–4211, USA
10 Stamford Road, Oakleigh, Melbourne 3166, Australia

© Cambridge University Press 1996

Printed in Great Britain by the University Press, Cambridge

CONTENTS

PART 1 (FEBRUARY 1996)

Instructions to Authors PAGE

CROPS AND SOILS

PILBEAM, C. J. Variation in harvest index of maize (*Zea mays*) and common bean (*Phaseolus vulgaris*) grown in a marginal rainfall area of Kenya 1

CONE, J. W., VAN GELDER, A. H. and MARVIN, H. J. P. Influence of drying method and ageing on chemical and physical properties and *in vitro* degradation characteristics of grass and maize samples 7

AMIN, MD R. and THOMAS, H. Growth and water relations of diverse populations of *Lolium perenne* exposed to drought in field, glasshouse and controlled environment 15

TALLOWIN, J. R. B. and BROOKMAN, S. K. E. The impact of differences in nitrogen content, nitrogen utilization and loss from laminae on competition between four grass species in an old pasture 25

BROCK, J. L., HUME, D. E. and FLETCHER, R. H. Seasonal variation in the morphology of perennial ryegrass (*Lolium perenne*) and cocksfoot (*Dactylis glomerata*) plants and populations in pastures under intensive sheep grazing 37

MCGRATH, S. P. and ZHAO, F. J. Sulphur uptake, yield responses and the interactions between nitrogen and sulphur in winter oilseed rape (*Brassica napus*) 53

SHEPHERD, M. A. and SYLVESTER-BRADLEY, R. Effect of nitrogen fertilizer applied to winter oilseed rape (*Brassica napus*) on soil mineral nitrogen after harvest and on the response of a succeeding crop of winter wheat to nitrogen fertilizer 63

DAVIES, D. B., GARWOOD, T. W. D. and ROCHFORD, A. D. H. Factors affecting nitrate leaching from a calcareous loam in East Anglia 75

ANIMALS

WANG, Y., DOUGLAS, G. B., WAGHORN, G. C., BARRY, T. N., FOOTE, A. G. and PURCHAS, R. W. Effect of condensed tannins upon the performance of lambs grazing *Lotus corniculatus* and lucerne (*Medicago sativa*) 87

SUTOH, M., OBARA, Y. and MIYAMOTO, S. The effect of sucrose supplementation on kinetics of nitrogen, ruminal propionate and plasma glucose in sheep 99

ROSE, M. T. and OBARA, Y. Effect of growth hormone on the response to insulin and glucose turnover in sheep 107

ABSTRACTS

Proceedings of the Twenty-Seventh Meeting of the Agricultural Research Modellers' Group 117

BOOK REVIEWS 123

PART 2 (MARCH 1996)

Instructions to Authors PAGE

CROPS AND SOILS

SEN, S. and CHALK, P. M. Stimulation of root growth and soil nitrogen uptake by foliar application of urea to wheat and sunflower 127

ORPHANOS, P. I. Direct and residual effect of phosphorus on dryland barley 137

SAHRAWAT, K. L., MULBAH, C. K., DIATTA, S., DELAUNE, R. D., PATRICK, W. H., JR, SINGH, B. N. and JONES, M. P. The role of tolerant genotypes and plant nutrients in the management of iron toxicity in lowland rice 143

WONG, C. C. and STÜR, W. W. Persistence of tropical forage grasses in shaded environments 151

PORQUEDDU, C., LOI, A. and COCKS, P. S. Hardseededness and pattern of hard seed breakdown in Sardinian populations of *Medicago polymorpha* under field conditions 161

GUTIÉRREZ BOEM, F. H. and LAVADO, R. S. The effects of soil sodicity on emergence, growth, development and yield of oilseed rape (*Brassica napus*) 169

LINNEMANN, A. R. Phenological development in bambara groundnut (*Vigna subterranea*) transferred from 14 to 11 h photoperiods 175

SIVAKUMAR, M. V. K., NTARE, B. R. and ROBERTS, J. M. Growth, yield and plant–water relations of four cowpea (*Vigna unguiculata*) cultivars in the Sahel 183
THOMSEN, I. K. and CHRISTENSEN, B. T. Availability to subsequent crops and leaching of nitrogen in ^{15}N-labelled sugarbeet tops and oilseed rape residues 191

ANIMALS

PIKE, D. J., OWEN, E. and SAID, A. N. The dacron bag technique for comparing rumen degradability of untreated and ammonia-treated barley straw – effect of particle size and degree of replication 201
MARAIS, J. P., FIGENSCHOU, D. L., ESCOTT-WATSON, P. L. and WEBBER, L. N. Administration in suspension-form of n-alkane external markers for dry matter intake and diet selection studies 207
DIVERIO, S., GODDARD, P. J. and GORDON, I. J. Physiological responses of farmed red deer to management practices and their modulation by long-acting neuroleptics 211
SEMIADI, G., HOLMES, C. W., BARRY, T. N. and MUIR, P. D. Effects of cold conditions on heat production by young sambar (*Cervus unicolor*) and red deer (*Cervus elaphus*) 221
ROOK, A. J. and HUCKLE, C. A. Sources of variation in the grazing behaviour of dairy cows 227
NSAHLAI, I. V. and UMUNNA, N. N. Comparison between reconstituted sheep faeces and rumen fluid inocula and between *in vitro* and *in sacco* digestibility methods as predictors of intake and *in vivo* digestibility 235

BOOK REVIEWS 249

PART 3 (MAY 1996)

Instructions to Authors PAGE

CROPS AND SOILS

RAMOS, J. M., GARCÍA DEL MORAL, L. F., BOUJENNA, A., SERRA, J., INSA, J. A. and ROYO, C. Grain yield, biomass and leaf area of triticale in response to sowing date and cutting stage in three contrasting Mediterranean environments 253
JENKYN, J. F., TODD, A. D., BAINBRIDGE, A. and DYKE, G. V. Effects of inoculum sources on the accuracy and precision of experiments testing different times of applying fungicides to control powdery mildew (*Erysiphe graminis* f.sp. *hordei*) on spring barley 259
WILMAN, D., MTENGETI, E. J. and MOSELEY, G. Physical structure of twelve forage species in relation to rate of intake by sheep 277
MTENGETI, E. J., WILMAN, D. and MOSELEY, G. Differences between twelve forage species in physical breakdown when eaten 287
EVANS, D. R., HUMPHREYS, M. O. and WILLIAMS, T. A. Forage yield and quality interactions between white clover and contrasting ryegrass varieties in grazed swards 295
THOMPSON, D. J. and STOUT, D. G. Influence of sowing rate on dry matter yield, plant density and survival of lucerne (*Medicago sativa*) under dryland and irrigated conditions 301
COLLINSON, S. T., AZAM-ALI, S. N., CHAVULA, K. M. and HODSON, D. A. Growth, development and yield of bambara groundnut (*Vigna subterranea*) in response to soil moisture 307
FREITAS, B. M. and PAXTON, R. J. The role of wind and insects in cashew (*Anacardium occidentale*) pollination in NE Brazil 319
CASTELLANOUS, J. Z., PEÑA-CABRIALES, J. J. and ACOSTA-GALLEGOS, J. A. ^{15}N-determined dinitrogen fixation capacity of common bean (*Phaseolus vulgaris*) cultivars under water stress 327
ERSKINE, W. Seed-size effects on lentil (*Lens culinaris*) yield potential and adaptation to temperature and rainfall in West Asia 335
MISSLEBROOK, T. H., SHEPHERD, M. A. and PAIN, B. F. Sewage sludge applications to grassland: influence of sludge type, time and method of application on nitrate leaching and herbage yield 343

ANIMALS

WANG, Y., DOUGLAS, G. B., WAGHORN, G. C., BARRY, T. N. and FOOTE, A. G. Effect of condensed tannins in *Lotus corniculatus* upon lactation performance in ewes 353
HOCKING EDWARDS, J. E., BIRTLES, M. J., HARRIS, P. M., PARRY, A. L., PATERSON, E., WICKHAM, G. A. and McCUTCHEON, S. N. Pre- and post-natal wool follicle development and density in sheep of five genotypes 363

BOOK REVIEWS 371

PART 4 (JUNE 1996)

Instructions to Authors PAGE

CROPS AND SOILS

GRUNDY, A. C., BOATMAN, N. D. and FROUD-WILLIAMS, R. J. Effects of herbicide and nitrogen fertilizer application on grain yield and quality of wheat and barley 379

MOOT, D. J., JAMIESON, P. D., HENDERSON, A. L., FORD, M. A. and PORTER, J. R. Rate of change in harvest index during grain-filling of wheat 387

WANG, X. W., LAI, J. R., FAN, L. and ZHANG, R. B. Effects of recurrent selection on populations of various generations in wheat by using the Tai Gu single dominant male-sterile gene 397

SLAFER, G. A. Differences in phasic development rate amongst wheat cultivars independent of responses to photoperiod and vernalization. A viewpoint of the intrinsic earliness hypothesis 403

CHRISTIANSEN, S., ABD EL MONEIM, A. M., COCKS, P. S. and SINGH, M. Seed yield and hardseededness of two amphicarpic pasture legumes (*Vicia sativa* ssp. *amphicarpa* and *Lathyrus ciliolatus*) and two annual medics (*Medicago rigidula* and *M. noeana*) 421

HIDE, G. A., WELHAM, S. J., READ, P. J. and AINSLEY, A. E. The yield of potato plants as affected by stem canker (*Rhizoctonia solani*), blackleg (*Erwinia carotovora* subsp. *atroseptica*) and by neighbouring plants 429

BROWN, J., DALE, M. F. B. and MACKAY, G. R. General adaptability of potato genotypes selected in the UK for the Mediterranean region 441

OWUSU, E. O., KIM, C.-S., HORIIKE, M. and HIRANO, C. Comparative biological and enzymatic studies on some host-adapted populations of melon and cotton aphid, *Aphis gossypii* (Homoptera: Aphididae) 449

ESECHIE, H. A., ELIAS, S., RODRIGUEZ, V. and AL-ASMI, H. S. Response of sunflower (*Helianthus annuus*) to planting pattern and population density in a desert climate 455

EL-SAYED, S. F., BADAWI, M. A., MAHMOUD, I. M. and MOTAWA, M. H. Some morphological characters and yield of broad bean (*Vicia faba*) as affected by pesticide treatments 463

KNOTT, C. M. The effect of cover crops on the establishment and yield of vining peas and on nitrate leaching 471

RUBÆK, G. H., HENRIKSEN, K., PETERSEN, J., RASMUSSEN, B. and SOMMER, S. G. Effects of application technique and anaerobic digestion on gaseous nitrogen loss from animal slurry applied to ryegrass (*Lolium perenne*) 481

ANIMALS

BORTOLUSSI, G., TERNOUTH, J. H. and MCMENIMAN, N. P. Dietary nitrogen and phosphorus depletion in cattle and their effects on liveweight gain, blood metabolite concentrations and phosphorus kinetics 493

TERNMOUTH, J. H., BORTOLUSSI, G., COATES, D. B., HENDRICKSEN, R. E. and MCLEAN, R. W. The phosphorus requirements of growing cattle consuming forage diets 503

NEUTZE, S. A., GOODEN, J. M. and ODDY, V. H. Uptake of labelled phenylalanine into different blood fractions in the portal vein and cranial mesenteric vein of lambs 511

BOOK REVIEWS 519

INDEX 523